

Погружение в Helm package manager

Олег Вознесенский



HighLoad++
Весна 2021

The package manager for kubernetes



Олег Вознесенский



 **X5** RETAIL GROUP

 **USE** TECH

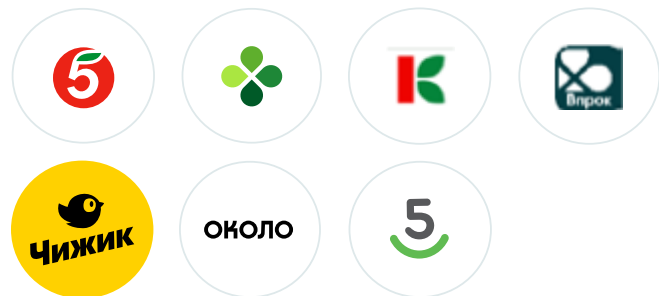
 **Ф Л А Н Т**

 **exactpro**
EXITUS ACTA PROBAT

О компании

X5 Retail Group — ведущая продуктовая розничная компания России.

Управляет брендами:



X5 LOGISTICS

X5 IMPORT

X5 ready food

DIALOG **X5**

Ключевые цифры:

25 лет

на рынке продуктового
ритейла в России

17 959

магазинов*

12,8%

доля рынка
продуктовой розницы

12,6%

доля онлайн-рынка
продуктов питания

~340 тыс.

сотрудников*



О X5 Технологии

X5 Технологии — бизнес-единица X5 Retail Group, которая создаёт комплексные цифровые решения для бизнеса и торговых сетей компании.

~ 2 700

сотрудников

34 / 113

активных продуктов /
проектов

> 56 млн

золотых записей клиентов

5.0 Пб

объемы хранения кластера
больших данных

324 / 20

ИТ-систем в
эксплуатации/критичных

> 1 200

физических серверов

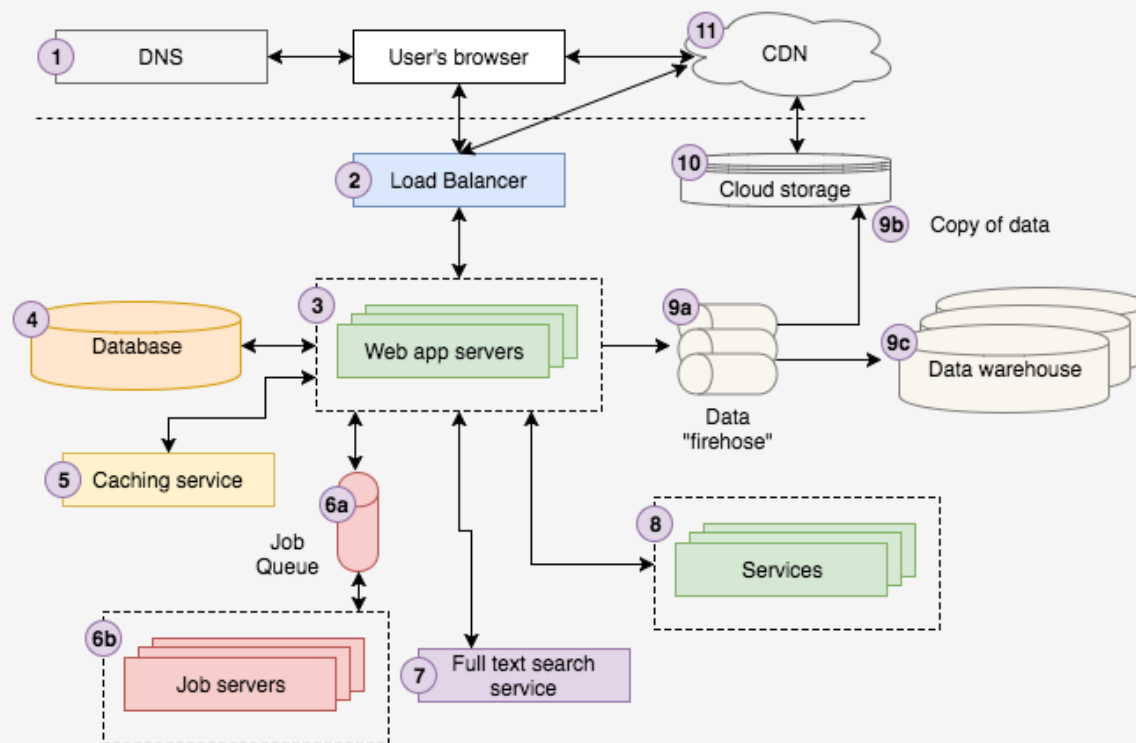


НЕМНОГО СКУЧНЫХ ВВОДНЫХ

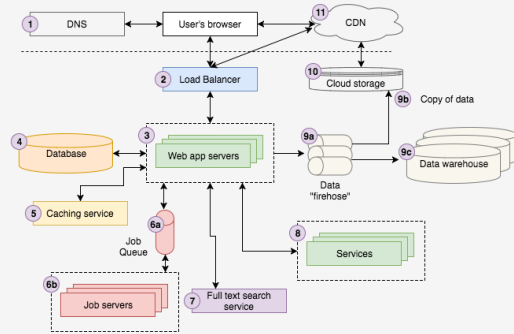
- Назначение
- Возможности
- Альтернативы
- Основные понятия и архитектура

ПОЧЕМУ ПОЯВИЛСЯ HELM?

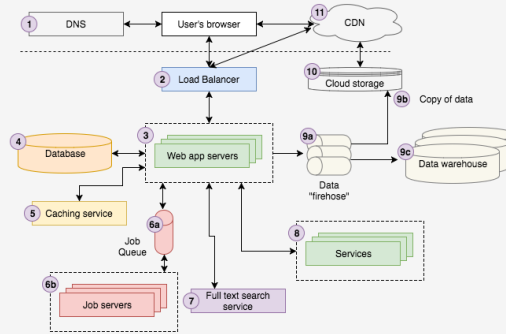
Архитектура современного WEB–приложения.



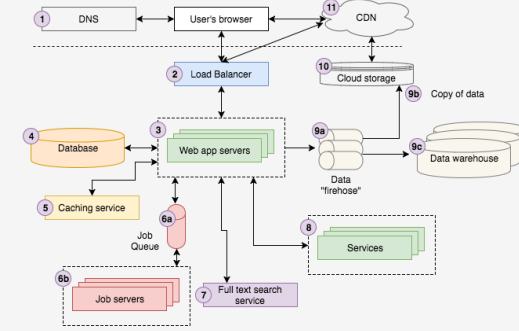
СИСТЕМНЫЕ ЛАНДШАФТЫ



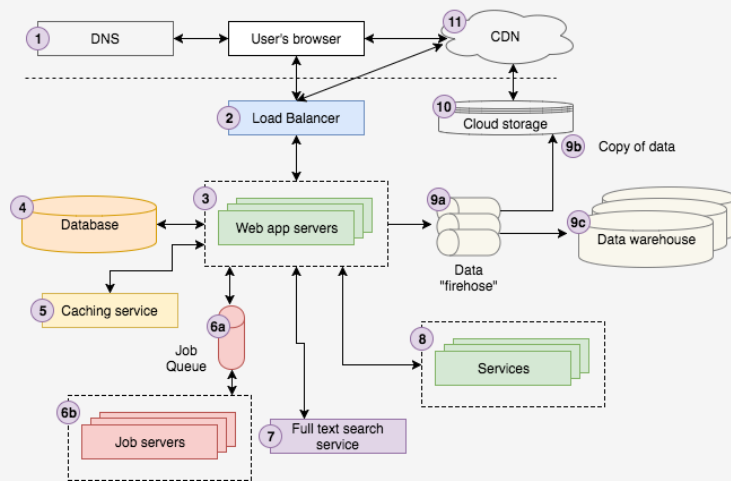
Dev



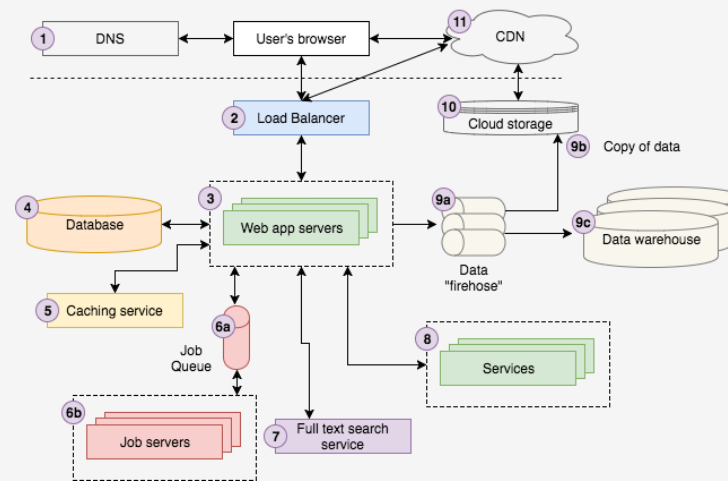
Test



Stage

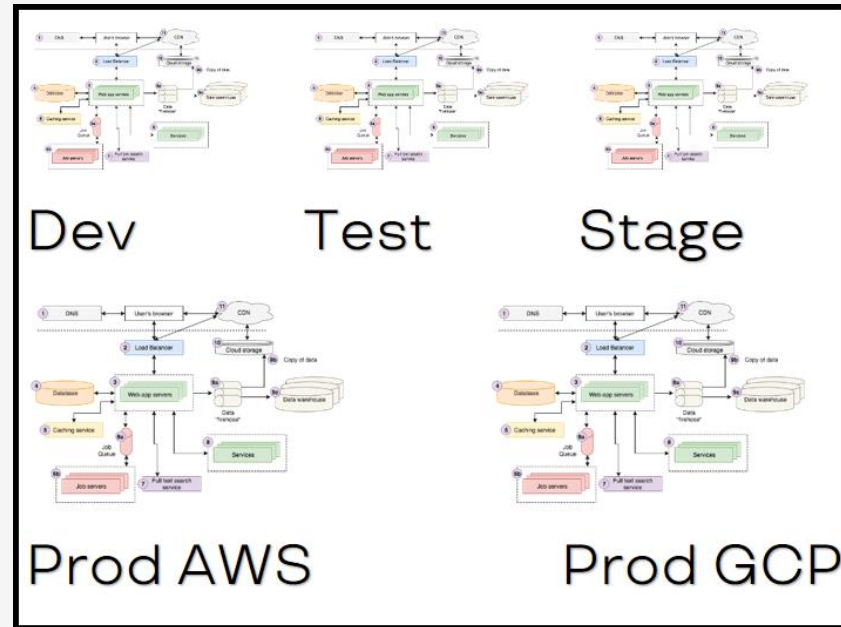


Prod AWS



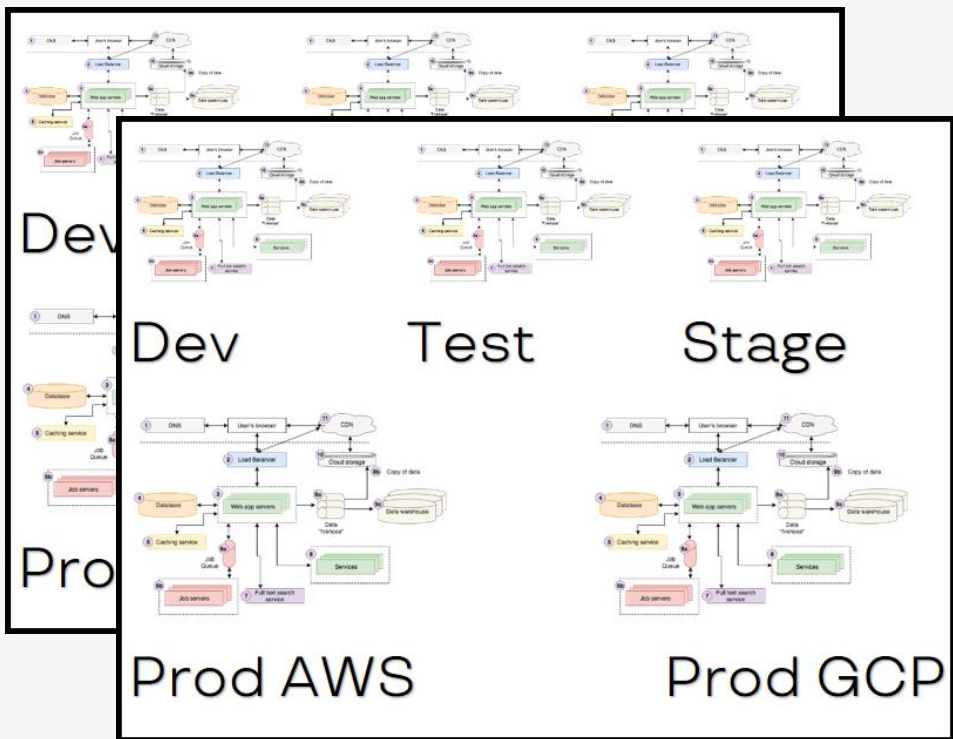
Prod GCP

ПРОЕКТЫ / МИКРОСЕРВИСЫ



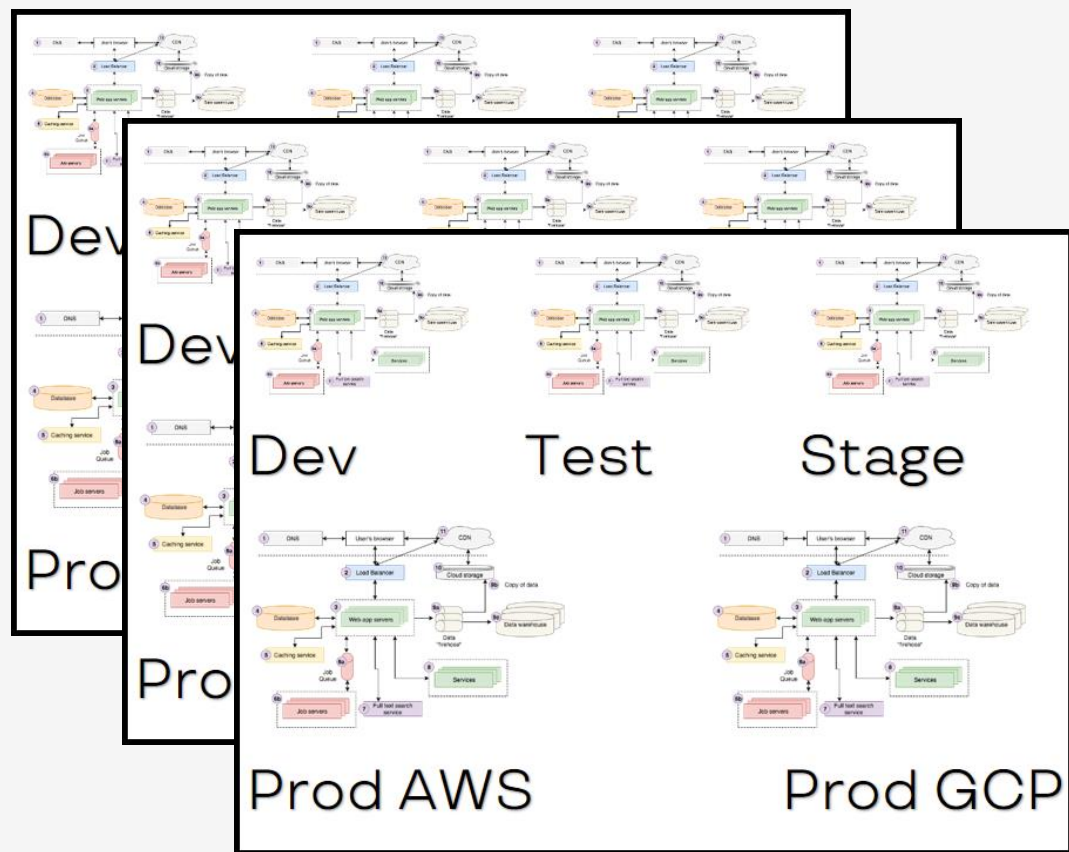
Project 1

ПРОЕКТЫ / МИКРОСЕРВИСЫ



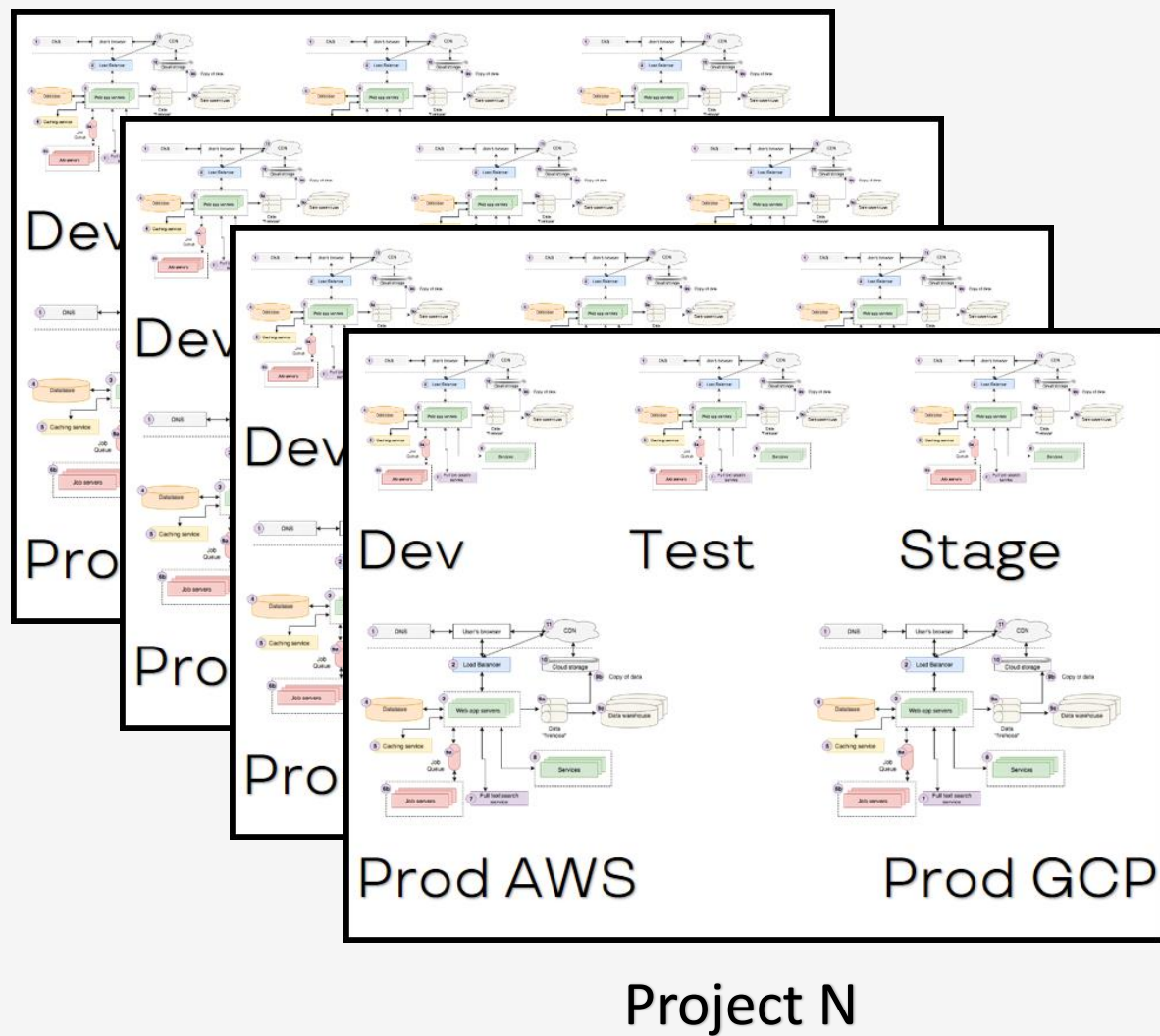
Project 2

ПРОЕКТЫ / МИКРОСЕРВИСЫ



Project 3

ПРОЕКТЫ / МИКРОСЕРВИСЫ



HELM – ВОЗМОЖНОСТИ



- Простая текстовая шаблонизация (go templates + Sprig framework)
- Управление релизами (установка, апгрейд, откат, удаление)
- Tracking выката
- 3-way merge
- Hooks & plugins
- Развитое community
- Множество готовых chart'ов для всего <https://artifacthub.io/>

artifacthub.io

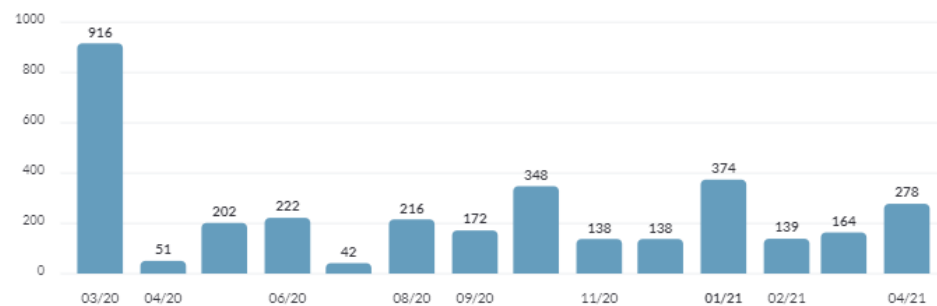
Packages available



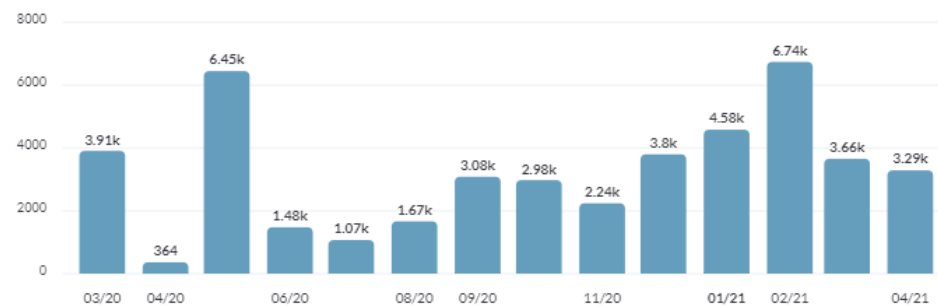
Releases available



New packages added monthly



New releases added monthly



3402 helm chart на апрель 2021



РЕШЕНИЯ ДЛЯ ДЕПЛОЯ В KUBERNETES

- **Kustomize**
- **Kubernetes operators**
- **Ansible**
- **Terraform**
- **Jsonnet**

Tanka (by Grafana)

Qbeq (by Splunk)

Ksonnet

НЕДОСТАТКИ HELM

- Только строковая шаблонизация
- Сложное расширение
- Низкий уровень абстракции
- Потенциальная запутанность



НЕДОСТАТКИ HELM?

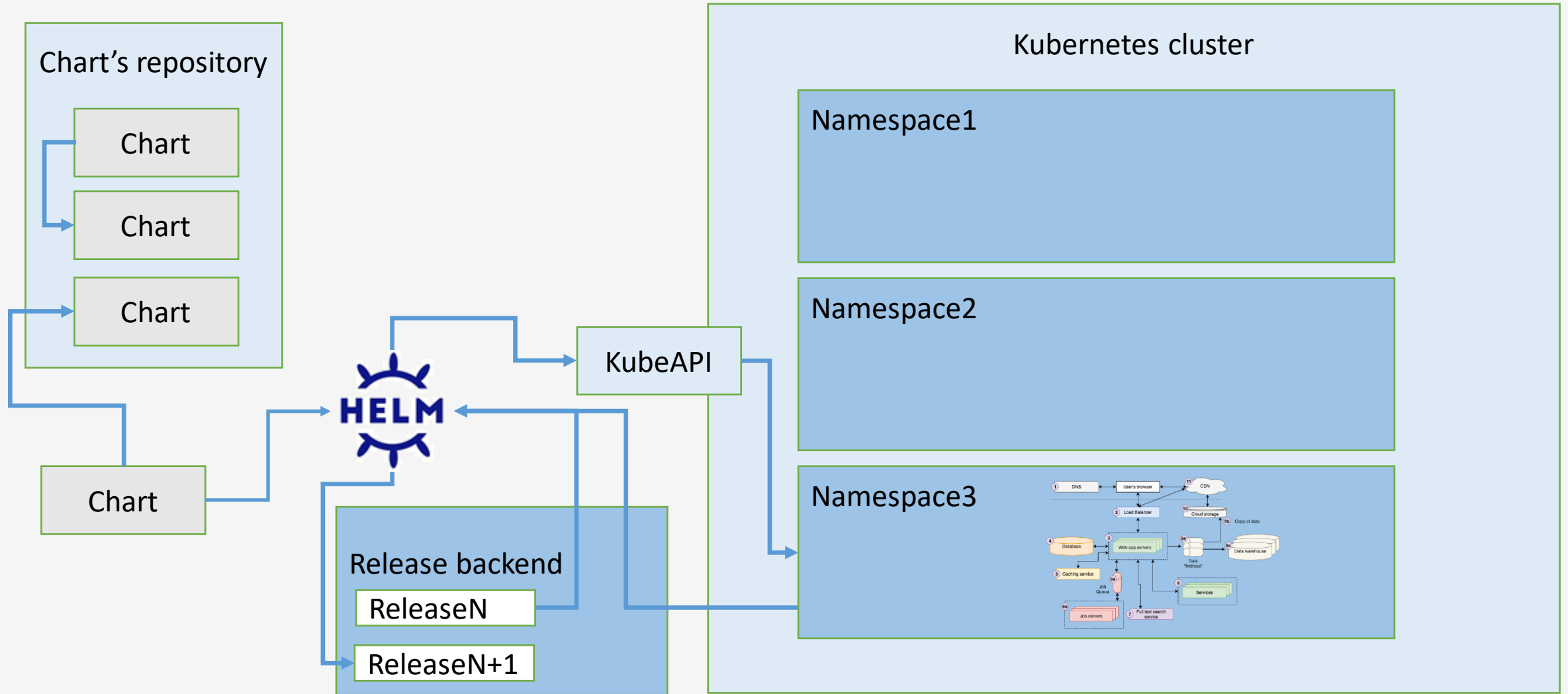
Helm Support!



+



АРХИТЕКТУРА HELM3



ОСНОВНЫЕ ПОНЯТИЯ

- **Chart**
- **Chart repository**
- **Release**
- **Values**

HELM CHART

helm create [chartname]

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

Guide: <https://helm.sh/docs/topics/charts/>

HELM CHART

helm create [chartname]

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

Guide: <https://helm.sh/docs/topics/charts/>

Chart.yaml – minio

```
1 apiVersion: v1
2 appVersion: master
3 description: High Performance, Kubernetes Native Object Storage
4 home: https://min.io
5 icon: https://min.io/resources/img/logo/MINIO_wordmark.png
6 keywords:
7 - storage
8 - object-storage
9 - S3
10 maintainers:
11 - email: dev@minio.io
12   name: MinIO, Inc
13 name: minio
14 sources:
15 - https://github.com/minio/minio
16 version: 8.0.10
```

Chart.yaml – minio

```
1 apiVersion: v1
2 appVersion: master
3 description: High Performance, Kubernetes Native Object Storage
4 home: https://min.io
5 icon: https://min.io/resources/img/logo/MINIO_wordmark.png
6 keywords:
7 - storage
8 - object-storage
9 - S3
10 maintainers:
11 - email: dev@minio.io
12   name: MinIO, Inc
13 name: minio
14 sources:
15 - https://github.com/minio/minio
16 version: 8.0.10
```

HELM CHART REPOSITORY

<https://example.com/charts>

```
charts/  
|  
|- index.yaml  
|  
|- alpine-0.1.2.tgz  
|  
|- alpine-0.1.2.tgz.prov
```



Guide: https://helm.sh/docs/topics/chart_repository/

HELM RELEASE, HELM VALUES

- Chart + Values = Release

```
~$ helm -n sum-demand-forecast-develop list
```

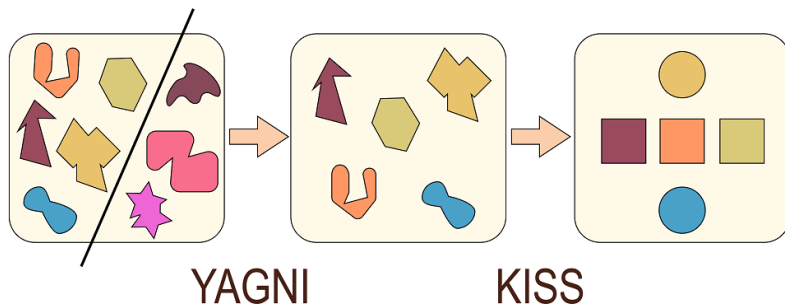
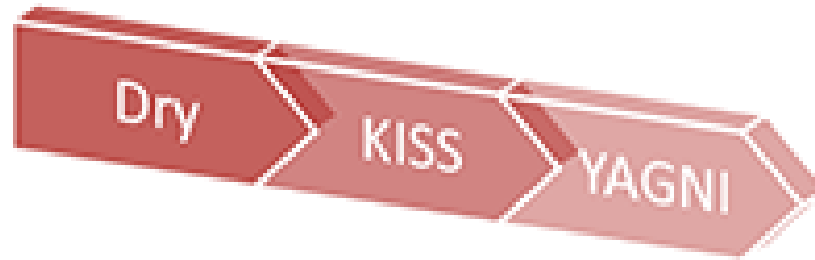
NAME	NAMESPACE	REVISION	UPDATED
sum-demand-forecast-develop	sum-demand-forecast-develop	36	2021-04-30 15:29:47.339850651 +0000

- Helm storage backends: configmap / **secret** / SQL

```
~$ kubectl -n sum-demand-forecast-develop get secret
```

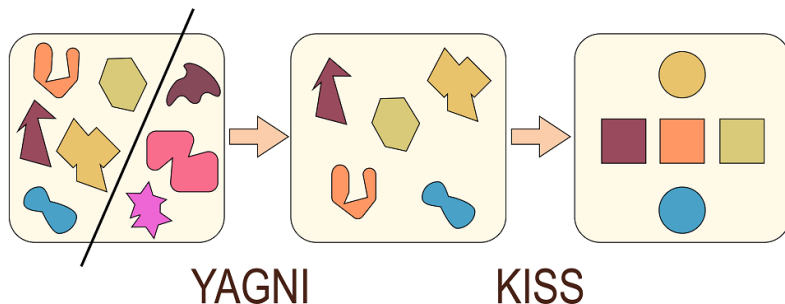
NAME	TYPE	DATA	AGE
sh.helm.release.v1.sum-demand-forecast-develop.v33	helm.sh/release.v1	1	39d
sh.helm.release.v1.sum-demand-forecast-develop.v35	helm.sh/release.v1	1	21d
sh.helm.release.v1.sum-demand-forecast-develop.v36	helm.sh/release.v1	1	16h

MUSTHAVE YAML-ДЕВЕЛОПЕРА



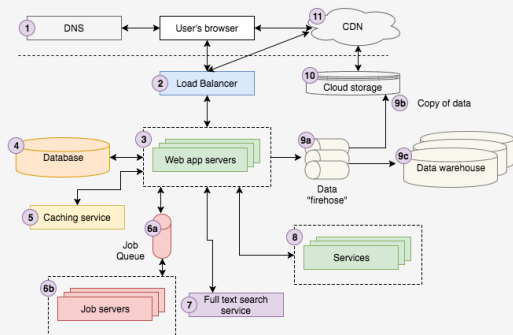
1. Кастомизация приложения в разрезе окружений
2. Переиспользование кода
3. Управление блоками кода по условию
4. Модульная разработка
5. Трекинг выката
6. Установка очерёдности запуска подов
7. Отладка
8. Релизный цикл
9. Расширение функциональности HELM

MUSTHAVE YAML-ДЕВЕЛОПЕРА

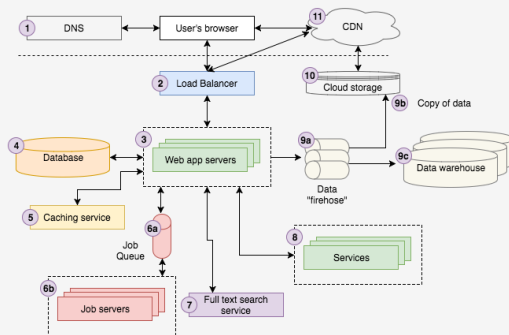


1. **Кастомизация приложения в разрезе окружений**
2. Переиспользование кода
3. Управление блоками кода по условию
4. Модульная разработка
5. Трекинг выката
6. Установка очерёдности запуска подов
7. Отладка
8. Релизный цикл
9. Расширение функциональности HELM

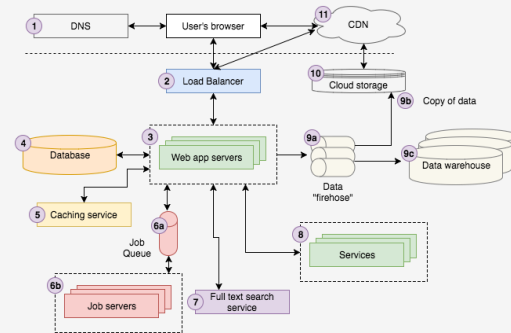
РАБОЧИЕ ОКРУЖЕНИЯ



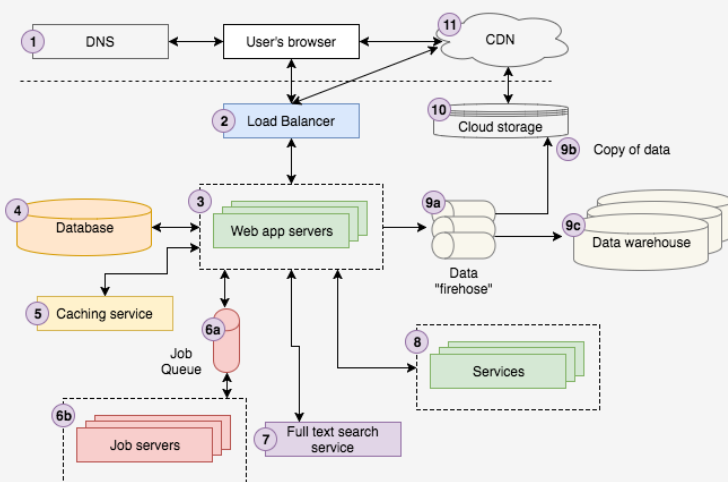
Dev



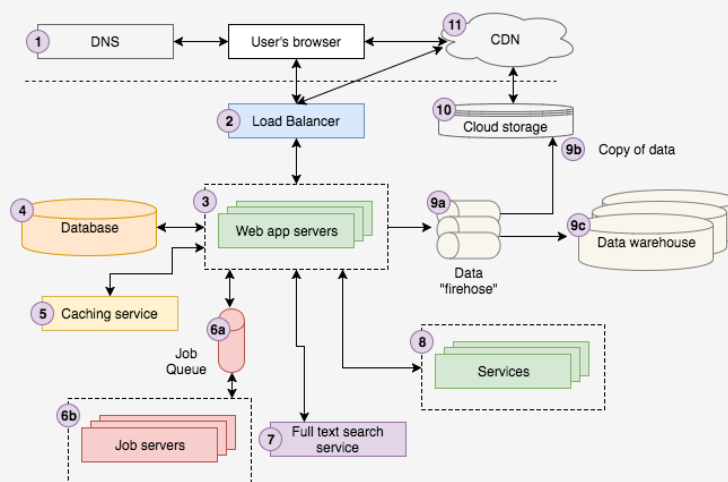
Test



Stage



Prod AWS



Prod GCP

HELM CHART

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

HELM CHART

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

values.yaml – ОПИСАНИЕ ЗНАЧЕНИЙ

```
1 node1:
2   value: "definition"
3   subNode1:
4     VALUE: "DEFINITION"
5     subNode21:
6       VALUE: SOME
7       VALUE1: Thing
8     subNode22:
9       VALUE: SOME
10      VALUE1: Thing
11 node2:
12   value: "definition"
13   subNode1:
14     - "listName1"
15     setting1: "settingValue1"
16     - "listName2"
17     setting1: "settingValue1"
```

values.yaml – ОПИСАНИЕ ЗНАЧЕНИЙ

```
1 app:
2   databaseurl: postgres://myapp:mypass@postgres:5432/backend
3   storage:
4     persistence: "true"
5     storageclass:
6       aws: gp2
7       gcp: standard
8     persistentVolumeSize:
9       aws: 10G
10      gcp: 20G
11 alerts:
12   from: "info.production@company.local"
13   receivers:
14     - "team@company.local"
15     host: "smtp.company.local"
16     - "support@subcompany.com"
17     host: "smtp.subcompany.com"
```


ИСПОЛЬЗОВАНИЕ VALUES

```
1     containers:
2     - name: application
3       image: registry.company.local/myapplication:0.0.1
4       env:
5       - name: DBURL
6         value: {{ .Values.app.databaseurl }}
7       - name: SAVECACHE
8         value: {{ .Values.app.storage.persistence }}
9       - name: NOTIFYFROM
10        value: {{ .Values.alerts.from }}
11     ports:
12     - name: http
13       containerPort: 8080
```

ИСПОЛЬЗОВАНИЕ VALUES

```
1     containers:
2     - name: application
3       image: registry.company.local/myapplication:0.0.1
4       env:
5       - name: DBURL
6         value: {{ .Values.app.databaseurl }} ←
7       - name: SAVECACHE
8         value: {{ .Values.app.storage.persistence }} ←
9       - name: NOTIFYFROM
10        value: {{ .Values.alerts.from }} ←
11     ports:
12     - name: http
13       containerPort: 8080
```

СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \  
  --set global.env=develop
```

СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
  --set global.env=develop \
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV
```

СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \  
  --set global.env=develop \  
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV \  
  --set app.cloud=aws,app.storage.storageclass.aws=gp3
```

СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
  --set global.env=develop \
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV \
  --set app.cloud=aws,app.storage.storageclass.aws=gp3 \
  --set alerts.receivers={"dev@company.local","dev@subcompany.com"}
```

СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
  --set global.env=develop \
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV \
  --set app.cloud=aws,app.storage.storageclass.aws=gp3 \
  --set alerts.receivers={"dev@company.local","dev@subcompany.com"} \
  --set alerts.receivers[0].host="smtpdev.subcompany.com"
```

СПОСОБЫ ПЕРЕДАЧИ VALUES

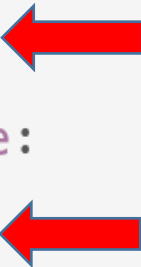
```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
  --set global.env=develop \
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV \
  --set app.cloud=aws,app.storage.storageclass.aws=gp3 \
  --set alerts.receivers={"dev@company.local","dev@subcompany.com"} \
  --set alerts.receivers[0].host="smtpdev.subcompany.com" \
  --values=./path/to/app.dev.yaml
```


СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
  --set global.env=develop \
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV \
  --set app.cloud=aws,app.storage.storageclass.aws=gp3 \
  --set alerts.receivers={"dev@company.local","dev@subcompany.com"} \
  --set alerts.receivers[0].host="smtpdev.subcompany.com" \
  --values=./path/to/app.dev.yaml \
  --values=./path/to/alerts.dev.yaml
```

РАБОТА СО СПИСКАМИ

```
1 app:
2   databaseurl: postgres://myapp:mypass@postgres:5432/backend
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7       gcp: standard
8     persistentVolumeSize:
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10      gcp: 20G
11 alerts:
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14     - "team@company.local"
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16     - "support@subcompany.com"
17     host: "smtp.subcompany.com"
```









СПОСОБЫ ПЕРЕДАЧИ VALUES

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
  --set global.env=develop \
  --set app.databaseurl=$POSTGRESQL_PASSWORD_DEV \
  --set app.cloud=aws,app.storage.storageclass.aws=gp3 \
  --set alerts.receivers={"dev@company.local","dev@subcompany.com"} \
  --set alerts.receivers[0].host="smtpdev.subcompany.com" \
  --values=./path/to/app.dev.yaml \
  --values=./path/to/alerts.dev.yaml
```

РАБОТА СО СПИСКАМИ

```
1  volumeClaimTemplates:
2  - metadata:
3      name: app-data
4      spec:
5          accessModes: [ "ReadWriteOnce" ]
6          resources:
7              requests:
8  {{ if eq .Values.app.cloud "aws" }}
9              storage: "{{ .Values.app.storage.persistenVolumeSize.aws }}"
10 {{ else }}
11              storage: "{{ .Values.app.storage.persistenVolumeSize.gcp }}"
12 {{ end }}
13 {{ if eq .Values.app.cloud "aws" }}
14          storageClassName: {{ .Values.app.storage.storgerclass.aws }}
15 {{ else }}
16          storageClassName: {{ .Values.app.storage.storgerclass.gcp }}
17 {{ end }}
```


РАБОТА СО СПИСКАМИ

```
1 volumeClaimTemplates:
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3       name: app-data
4     spec:
5       accessModes: [ "ReadWriteOnce" ]
6       resources:
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8  {{ if eq .Values.app.cloud "aws" }}
9           storage: "{{ .Values.app.storage.persistenVolumeSize.aws }}"
10  {{ else }}
11           storage: "{{ .Values.app.storage.persistenVolumeSize.gcp }}"
12  {{ end }}
13  {{ if eq .Values.app.cloud "aws" }}
14           storageClassName: {{ .Values.app.storage.storgerclass.aws }}
15  {{ else }}
16           storageClassName: {{ .Values.app.storage.storgerclass.gcp }}
17  {{ end }}
```

РАБОТА СО СПИСКАМИ


```
1 volumeClaimTemplates:
2   - metadata:
3       name: app-data
4     spec:
5       accessModes: [ "ReadWriteOnce" ]
6       resources:
7         requests:
8           storage: >-
9             {{ first (pluck .Values.app.cloud .Values.app.storage.persistenVolumeSize) | quote }}
10      storageClassName: {{ first (pluck .Values.app.cloud .Values.app.storage.storgeclass) }}
```

РАБОТА СО СПИСКАМИ

```
1 volumeClaimTemplates:
2   - metadata:
3       name: app-data
4     spec:
5       accessModes: [ "ReadWriteOnce" ]
6       resources:
7         requests:
8           storage: >- 
9             {{ first (pluck .Values.app.cloud .Values.app.storage.persistenVolumeSize) | quote }}
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```


РАБОТА СО СПИСКАМИ

```
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3       name: app-data
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6       resources:
7         requests:
8           storage: >-
9             {{ first (pluck .Values.app.cloud .Values.app.storage.persistenVolumeSize) | quote }}
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```



РАБОТА СО СПИСКАМИ

```
1 volumeClaimTemplates:
2   - metadata:
3       name: app-data
4     spec:
5       accessModes: [ "ReadWriteOnce" ]
6       resources:
7         requests:
8           storage: >-
9             {{ first (pluck .Values.app.cloud .Values.app.storage.persistenVolumeSize) | quote }}
10      storageClassName: {{ first (pluck .Values.app.cloud .Values.app.storage.storgeclass) }}
```



РАБОТА СО СПИСКАМИ

```
1 volumeClaimTemplates:
2   - metadata:
3     name: app-data
4   spec:
5     accessModes: [ "ReadWriteOnce" ]
6     resources:
7       requests:
8         storage >-
9         {{ first (pluck .Values.app.cloud .Values.app.storage.persistenVolumeSize) | quote }}
10    storageClassName: {{ first (pluck .Values.app.cloud .Values.app.storage.storgeclass) }}
```



СТАНДАРТНЫЕ ЗНАЧЕНИЯ HELM

Chart: The contents of the Chart.yaml file. Any data in Chart.yaml will be accessible here. For example `{{ .Chart.Name }}-{{ .Chart.Version }}` will print out the mychart-0.1.0.

Values: Values passed into the template from the values.yaml file and from user-supplied files. By default, Values is empty.

Release: This object describes the release itself. It has several objects inside of it:

Release.Name: The release name

Release.Namespace: The namespace to be released into (if the manifest doesn't override)

Release.IsUpgrade: This is set to true if the current operation is an upgrade or rollback.

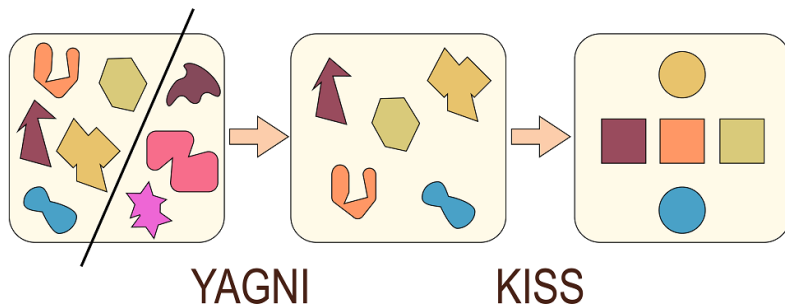
Release.IsInstall: This is set to true if the current operation is an install.

Guide: https://helm.sh/docs/chart_template_guide/builtin_objects/

СТАНДАРТНЫЕ ЗНАЧЕНИЯ HELM

```
1 apiVersion: apps/v1
2 kind: Deployment
3 metadata:
4   name: {{ .Chart.Name }}-worker ←
5 spec:
6   strategy:
7     type: RollingUpdate
8     rollingUpdate:
9       maxUnavailable: 1
10      maxSurge: 1
11 selector:
12   matchLabels:
13     app: {{ .Release.Name }}-worker ←
14 template:
15   metadata:
16     labels:
17       app: {{ .Release.Name }}-worker ←
```

MUSTHAVE YAML-ДЕВЕЛОПЕРА



1. Кастомизация приложения в разрезе окружений
2. **Переиспользование кода**
3. Управление блоками кода по условию
4. Модульная разработка
5. Трекинг выката
6. Установка очерёдности запуска подов
7. Отладка
8. Релизный цикл
9. Расширение функциональности HELM

ПЕРЕИСПОЛЬЗОВАНИЕ КОДА

```
1 app:
2     PYTHONUNBUFFERED: "1"
3     FLASK_APP: "project/__init__.py"
4     FLASK_DEBUG: "1"
5     APP_USERNAME: "throw_app"
6     JSON_AS_ASCII: "False"
7     SEND_FILE_MAX_AGE_DEFAULT: "0"
8     THROW_DB_HOST: "192.168.5.11"
9     THROW_DB_NAME: "throw_dev"
10    THROW_USER: "throw_user"
11    THROW_DB_PASSWORD: "throw_test_throw_test"
```

- backend
- websockets
- workers
- cronjobs

HELM NAMED TEMPLATES

_
_*.tpl
_*.yaml

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

```
1 {{- define "app_envs" }}
2 - name: PYTHONUNBUFFERED
3   value: {{ .Values.app.PYTHONUNBUFFERED }}
4 - name: FLASK_APP
5   value: {{ .Values.app.FLASK_APP }}
6 - name: FLASK_DEBUG
7   value: {{ .Values.app.FLASK_DEBUG }}
8 - name: APP_USERNAME
9   value: {{ .Values.app.APP_USERNAME }}
10 - name: JSON_AS_ASCII
11   value: {{ .Values.app.JSON_AS_ASCII }}
12 - name: SEND_FILE_MAX_AGE_DEFAULT
13   value: {{ .Values.app.SEND_FILE_MAX_AGE_DEFAULT }}
14 - name: THROW_DB_HOST
15   value: {{ .Values.app.THROW_DB_HOST }}
16 - name: THROW_DB_NAME
17   value: {{ .Values.app.THROW_DB_NAME }}
18 - name: THROW_USER
19   value: {{ .Values.app.THROW_USER }}
20 - name: THROW_DB_PASSWORD
21   value: {{ .Values.app.THROW_DB_PASSWORD }}
22 {{- end }}
```

_envs.tpl

HELM NAMED TEMPLATES – INCLUDE

```
1      spec:
2        containers:
3          - name: myapplication
4            image: {{ .Values.global.image_name }}
5            imagePullPolicy: Always
6            env:
7              - name: KUBERNETES_DEPLOYED
8                value: {{ now }}
9      {{- include "app_envs" . | indent 12 }}
10     ports:
11       - name: http
12         containerPort: 5000
```

NAMED TEMPLATES – LABELS

```
1 {{ define "labels" }}  
2 team: backend  
3 departament: bigdata  
4 project: frov-planning  
5 {{ end }}
```

```
1   template:  
2     metadata:  
3       labels:  
4         app: {{ .Chart.Name }}  
5 {{ include "labels" . | indent 8 }}
```

NAMED TEMPLATES – ANNOTATIONS

```
1 {{ define "annotations" }}
2 annotations:
3   pipeline: {{ .Values.global.pipeline | quote }}
4   user: {{ .Values.global.pipelinerunner | quote }}
5 {{ end }}
```

```
1 apiVersion: apps/v1
2 kind: Deployment
3 metadata:
4   name: {{ .Chart.Name }}
5 {{- include "annotations" . | indent 2}}
```

NAMED TEMPLATES – TOLERATIONS

```
1 {{ define "nodelistselector" }}
2 nodeSelector:
3   "mcs-nodepool": "system"
4 tolerations:
5 - key: dedicated
6   operator: Equal
7   value: system
8 {{ end }}
```

```
1   podTemplate:
2     spec:
3       tolerations:
4       {{- include "nodelistselector" . | indent 8 }}
```

NAMED TEMPLATES – AFFINITY

```
1 {{ define "affinity" }}
2 {{ if eq .Values.global.ens "production" }}
3     affinity:
4     podAntiAffinity:
5     requiredDuringSchedulingIgnoredDuringExecution:
6     - labelSelector:
7       matchExpressions:
8       - key: app
9         operator: In
10       values:
11       - {{ .Chart.Name }}
12     topologyKey: kubernetes.io/hostname
13 {{ end }}
14 {{ end }}
```

```
1   template:
2     metadata:
3     labels:
4     app: {{ .Chart.Name }}
5     spec:
6 {{ include "affinity" . }}
```

ПРИМЕР values.yaml

```
1 app:
2   PYTHONUNBUFFERED: "1"
3   FLASK_APP: "project/__init__.py"
4   FLASK_DEBUG: "1"
5   APP_USERNAME: "throw_app"
6   JSON_AS_ASCII: "False"
7   SEND_FILE_MAX_AGE_DEFAULT: "0"
8   THROW_DB_HOST: "192.168.5.11"
9   THROW_DB_NAME: "throw_dev"
10  THROW_USER: "throw_user"
11  THROW_DB_PASSWORD: "throw_test_throw_test"
```

ПРИМЕР DEFINE ДЛЯ env

```
1 {{- define "app_envs" }}
2 - name: PYTHONUNBUFFERED
3   value: {{ .Values.app.PYTHONUNBUFFERED }}
4 - name: FLASK_APP
5   value: {{ .Values.app.FLASK_APP }}
6 - name: FLASK_DEBUG
7   value: {{ .Values.app.FLASK_DEBUG }}
8 - name: APP_USERNAME
9   value: {{ .Values.app.APP_USERNAME }}
10 - name: JSON_AS_ASCII
11   value: {{ .Values.app.JSON_AS_ASCII }}
12 - name: SEND_FILE_MAX_AGE_DEFAULT
13   value: {{ .Values.app.SEND_FILE_MAX_AGE_DEFAULT }}
14 - name: THROW_DB_HOST
15   value: {{ .Values.app.THROW_DB_HOST }}
16 - name: THROW_DB_NAME
17   value: {{ .Values.app.THROW_DB_NAME }}
18 - name: THROW_USER
19   value: {{ .Values.app.THROW_USER }}
20 - name: THROW_DB_PASSWORD
21   value: {{ .Values.app.THROW_DB_PASSWORD }}
22 {{- end }}
```

RANGE #1 – ЗАДАННЫЙ СПИСОК

```
1 {{ range tuple "1" "2" "3" }}
2 ---
3 apiVersion: v1
4 kind: PersistentVolume
5 metadata:
6   name: {{ $.Chart.Name }}-server-{{ . }}
7 spec:
8   nodeAffinity:
9     required:
10      nodeSelectorTerms:
11      - matchExpressions:
12      - key: kubernetes.io/hostname
13        operator: In
14        values:
15      - kube-clickhouse-{{ . }}
16   capacity:
17     storage: 10Gi
18   accessModes:
19     - ReadWriteOnce
20   persistentVolumeReclaimPolicy: Retain
21   storageClassName: clickhouse-server-data
22   local:
23     path: /mnt/localstorage/clickhouse-server-data
24 {{ end }}
```

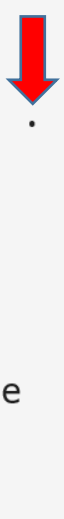

RANGE #1 – ЗАДАННЫЙ СПИСОК



```
1 {{ range tuple "1" "2" "3" }}
2 ---
3 apiVersion: v1
4 kind: PersistentVolume
5 metadata:
6   name: {{ $.Chart.Name }}-server-{{ . }}
7 spec:
8   nodeAffinity:
9     required:
10      nodeSelectorTerms:
11      - matchExpressions:
12      - key: kubernetes.io/hostname
13        operator: In
14        values:
15      - kube-clickhouse-{{ . }}
16   capacity:
17     storage: 10Gi
18   accessModes:
19     - ReadWriteOnce
20   persistentVolumeReclaimPolicy: Retain
21   storageClassName: clickhouse-server-data
22   local:
23     path: /mnt/localstorage/clickhouse-server-data
24 {{ end }}
```

RANGE #1 – ЗАДАННЫЙ СПИСОК

```
1 {{ range tuple "1" "2" "3" }}
2 ---
3 apiVersion: v1
4 kind: PersistentVolume
5 metadata:
6   name: {{ $.Chart.Name }}-server-{{ . }}
7 spec:
8   nodeAffinity:
9     required:
10      nodeSelectorTerms:
11      - matchExpressions:
12      - key: kubernetes.io/hostname
13        operator: In
14        values:
15      - kube-clickhouse-{{ . }}
16 capacity:
17   storage: 10Gi
18 accessModes:
19   - ReadWriteOnce
20 persistentVolumeReclaimPolicy: Retain
21 storageClassName: clickhouse-server-data
22 local:
23   path: /mnt/localstorage/clickhouse-server-data
24 {{ end }}
```



RANGE #1 – ЗАДАННЫЙ СПИСОК

```
1 {{ range tuple "1" "2" "3" }}
2 ---
3 apiVersion: v1
4 kind: PersistentVolume
5 metadata:
6   name: {{ $.Chart.Name }}-server-{{ . }}
7 spec:
8   nodeAffinity:
9     required:
10      nodeSelectorTerms:
11      - matchExpressions:
12      - key: kubernetes.io/hostname
13        operator: In
14        values:
15      - kube-clickhouse-{{ . }}
16   capacity:
17     storage: 10Gi
18   accessModes:
19     - ReadWriteOnce
20   persistentVolumeReclaimPolicy: Retain
21   storageClassName: clickhouse-server-data
22   local:
23     path: /mnt/localstorage/clickhouse-server-data
24 {{ end }}
```

RANGE #2 – values.yaml

```
1 cronjobs:
2 # Подготовительные мероприятия к старту нового сезона (за час до старта)
3 # 23:00 MSK (20:00 UTC)
4   prepare-start-season:
5     schedule: "0 20 * * *"
6     command: '["bash"]'
7     args: '["-c", "/app/src/manage.py start_period"]'
8 # Мероприятия по закрытию периода
9 # 12:00 MSK (09:00 UTC)
10  complete-period:
11    schedule: "0 9 * * *"
12    command: '["bash"]'
13    args: '["-c", "/app/src/manage.py complete_period"]'
14 # Отправка наград
15 # 03:05 MSK (00:05 UTC)
16  send-pending-rewards:
17    schedule: "5 0 * * *"
18    command: '["bash"]'
19    args: '["-c", "/app/src/manage.py send_pending_rewards --ignore-previous"]'
```


RANGE #2 – template

```

1 {{- range $name, $params := .Values.cronjobs }}
2   apiVersion: batch/v2alpha1
3   kind: CronJob
4   metadata:
5     name: {{ $.Chart.Name }}-{{ $name }}
6   spec:
7     schedule: {{ $params.schedule | quote }}
8     concurrencyPolicy: Forbid
9     jobTemplate:
10       spec:
11         template:
12           spec:
13             containers:
14               - name: job
15                 command: {{ $params.command }}
16                 args: {{ $params.args }}
17                 image: {{ $.Values.global.image_name }}
18                 env:
19                   {{ include "common_envs" $ | indent 14 }}
20                 restartPolicy: OnFailure
21             {{- end }}

```


RANGE #2 – template



```
1 {{- range $name, $params := .Values.cronjobs }}
2   apiVersion: batch/v2alpha1
3   kind: CronJob
4   metadata:
5     name: {{ $.Chart.Name }}-{{ $name }}
6   spec:
7     schedule: {{ $params.schedule | quote }}
8     concurrencyPolicy: Forbid
9     jobTemplate:
10      spec:
11        template:
12          spec:
13            containers:
14              - name: job
15                command: {{ $params.command }}
16                args: {{ $params.args }}
17                image: {{ $.Values.global.image_name }}
18                env:
19              {{ include "common_envs" $ | indent 14 }}
20              restartPolicy: OnFailure
21 {{- end }}
```

RANGE #2 – template

```
1 {{- range $name, $params := .Values.cronjobs }}
2   apiVersion: batch/v2alpha1
3   kind: CronJob
4   metadata:
5     name: {{ $.Chart.Name }}-{{ $name }}
6   spec:
7     schedule: {{ $params.schedule | quote }}
8     concurrencyPolicy: Forbid
9     jobTemplate:
10      spec:
11        template:
12          spec:
13            containers:
14              - name: job
15                command: {{ $params.command }}
16                args: {{ $params.args }}
17                image: {{ $.Values.global.image_name }}
18                env:
19              {{ include "common_envs" $ | indent 14 }}
20              restartPolicy: OnFailure
21 {{- end }}
```




RANGE #2 – template

```
1 {{- range $name, $params := .Values.cronjobs }}
2 apiVersion: batch/v2alpha1
3 kind: CronJob
4 metadata:
5   name: {{ $.Chart.Name }}-{{ $name }}
6 spec:
7   schedule: {{ $params.schedule | quote }} ←
8   concurrencyPolicy: Forbid
9   jobTemplate:
10     spec:
11       template:
12         spec:
13           containers:
14             - name: job
15               command: {{ $params.command }} ←
16               args: {{ $params.args }} ←
17               image: {{ $.Values.global.image_name }}
18               env:
19 {{ include "common_envs" $ | indent 14 }}
20               restartPolicy: OnFailure
21 {{- end }}
```


RANGE #2 – template

```
1 {{- range $name, $params := .Values.cronjobs }}
2   apiVersion: batch/v2alpha1
3   kind: CronJob
4   metadata:
5     name: {{ $.Chart.Name }}-{{ $name }}
6   spec:
7     schedule: {{ $params.schedule | quote }}
8     concurrencyPolicy: Forbid
9     jobTemplate:
10      spec:
11        template:
12          spec:
13            containers:
14              - name: job
15                command: {{ $params.command }}
16                args: {{ $params.args }}
17                image: {{ $.Values.global.image_name }}
18                env:
19              {{ include "common_envs" $ | indent 14 }}
20              restartPolicy: OnFailure
21 {{- end }}
```



RANGE #2 – template

```
1 {{- range $name, $params := .Values.cronjobs }}
2   apiVersion: batch/v2alpha1
3   kind: CronJob
4   metadata:
5     name: {{ $.Chart.Name }}-{{ $name }}
6   spec:
7     schedule: {{ $params.schedule | quote }}
8     concurrencyPolicy: Forbid
9     jobTemplate:
10      spec:
11        template:
12          spec:
13            containers:
14              - name: job
15                command: {{ $params.command }}
16                args: {{ $params.args }}
17                image: {{ $.Values.global.image_name }}
18                env:
19              {{ include "common_envs" $ | indent 14 }}
20              restartPolicy: OnFailure
21 {{- end }}
```



RANGE #2 – template

```
1 {{- range $name, $params := .Values.cronjobs }}
2 ---
3 apiVersion: batch/v2alpha1
4 kind: CronJob
5 metadata:
6   name: {{ $.Chart.Name }}-{{ $name }}
7 spec:
8   schedule: {{ $params.schedule | quote }}
9   concurrencyPolicy: Forbid
10  jobTemplate:
11    spec:
12      template:
13        spec:
14          containers:
15            - name: job
16              command: {{ $params.command }}
17              args: {{ $params.args }}
18              image: {{ $.Values.global.image_name }}
19              env:
20                {{ include "common_envs" $ | indent 14 }}
21              restartPolicy: OnFailure
22 {{- end }}
```



ПРИМЕР DEFINE ДЛЯ env

```
1 {{- define "app_envs" }}
2 - name: PYTHONUNBUFFERED
3   value: {{ .Values.app.PYTHONUNBUFFERED }}
4 - name: FLASK_APP
5   value: {{ .Values.app.FLASK_APP }}
6 - name: FLASK_DEBUG
7   value: {{ .Values.app.FLASK_DEBUG }}
8 - name: APP_USERNAME
9   value: {{ .Values.app.APP_USERNAME }}
10 - name: JSON_AS_ASCII
11   value: {{ .Values.app.JSON_AS_ASCII }}
12 - name: SEND_FILE_MAX_AGE_DEFAULT
13   value: {{ .Values.app.SEND_FILE_MAX_AGE_DEFAULT }}
14 - name: THROW_DB_HOST
15   value: {{ .Values.app.THROW_DB_HOST }}
16 - name: THROW_DB_NAME
17   value: {{ .Values.app.THROW_DB_NAME }}
18 - name: THROW_USER
19   value: {{ .Values.app.THROW_USER }}
20 - name: THROW_DB_PASSWORD
21   value: {{ .Values.app.THROW_DB_PASSWORD }}
22 {{- end }}
```

ПРИМЕР RANGE ДЛЯ env

```
1 {{- define "app_envs" }}  
2  
3 {{- range $name, $value := .Values.app }}  
4 -   name: {{ $name }}  
5     value: {{ $value }}  
6 {{- end }}  
7  
8 {{- end }}
```

ПРИМЕР RANGE ДЛЯ env

```
1 {{- define "app_envs" }}
2
3 {{- range $name, $value := .Values.app }}
4   - name: {{ $name }}
5     value: {{ $value }}
6 {{- end }}
7
8 - name: GIT_COMMIT
9   value: "{{ .Values.global.git_commit }}"
10 - name: GIT_TAG
11   value: "{{ .Values.global.git_tag }}"
12
13 {{- end }}
```

ОДИН values.yaml для ВСЕХ ОКРУЖЕНИЙ

```
1 app:
2   PYTHONUNBUFFERED: "1"
3   FLASK_APP: "project/__init__.py"
4   FLASK_DEBUG: "1"
5   APP_USERNAME: "throw_app"
6   JSON_AS_ASCII: "False"
7   SEND_FILE_MAX_AGE_DEFAULT: "0"
8   THROW_DB_HOST: "192.168.5.11"
9   THROW_DB_NAME: "throw_dev"
10  THROW_USER: "throw_user"
11  THROW_DB_PASSWORD: "throw_test_throw_test"
```

ОДИН values.yaml для ВСЕХ ОКРУЖЕНИЙ

```
1 app:
2   PYTHONUNBUFFERED:
3     _default: "1"
4   FLASK_APP:
5     _default: "project/__init__.py"
6   FLASK_DEBUG:
7     _default: "1"
8   APP_USERNAME:
9     _default: "throw_app"
10  JSON_AS_ASCII:
11    _default: "False"
12  THROW_DB_HOST:
13    _default: "192.168.5.11"
14    stage: "192.168.4.9"
15    prod: "192.168.4.91"
16  THROW_DB_NAME:
17    _default: "throw_dev"
18    test: "throw"
19    stage: "throw_preprod"
20    prod: "pproduction"
```


ОДИН values.yaml ДЛЯ ВСЕХ ОКРУЖЕНИЙ

```
1 {{- define "app_envs" }}
2
3 {{- range $name, $map := .Values.app }}
4 {{- $value := pluck $.Values.global.env $map | first | default $map._default }}
5 - name: {{ $name }}
6   value: {{ $value | quote }}
7 {{- end }}
8
9 {{- end }}
```

ОДИН values.yaml ДЛЯ ВСЕХ ОКРУЖЕНИЙ

```
1 {{- define "app_envs" }}
2
3 {{- range $name, $map := .Values.app }}
4 {{- $value := pluck $.Values.global.env $map | first | default $map._default }}
5 - name: {{ $name }}
6   value: {{ $value | quote }}
7 {{- end }}
8
9 {{- end }}
```



HELM TIPS AND TRICKS

Chart best practices

https://helm.sh/docs/chart_best_practices/

Chart tips and tricks

https://helm.sh/docs/howto/charts_tips_and_tricks/

Helm template function list

https://helm.sh/docs/chart_template_guide/function_list/

Sprig Function Documentation

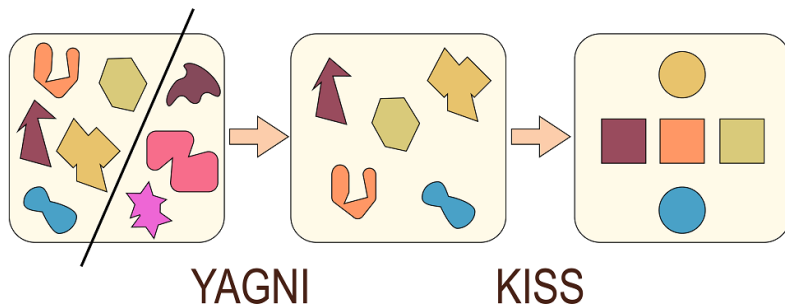
<http://masterminds.github.io/sprig/>

HELM TIPS AND TRICKS

```
1 kind: Deployment
2 spec:
3   template:
4     metadata:
5       annotations:
6         checksum/config: >-
7         {{ include (print $.Template.BasePath "/configmap.yaml") . | sha256sum }}
```



MUSTHAVE YAML-ДЕВЕЛОПЕРА



1. Кастомизация приложения в разрезе окружений
2. Переиспользование кода
3. **Управление блоками кода по условию**
4. Модульная разработка
5. Трекинг выката
6. Установка очерёдности запуска подов
7. Отладка
8. Релизный цикл
9. Расширение функциональности HELM

УПРАВЛЕНИЕ БЛОКАМИ КОДА


```
{{- if and (ne .Values.global.env "production") (ne .Values.global.env "loadtest") }}  
---  
apiVersion: apps/v1  
kind: StatefulSet  
metadata:  
  name: {{ .Chart.Name }}-postgresql  
spec:  
  serviceName: postgres  
  selector:  
    matchLabels:  
      service: postgresql  
[...skip...]  
{{- end }}
```

УПРАВЛЕНИЕ БЛОКАМИ КОДА

```
1 {{ if .Values.app.storage.persistence }}
2     volumeMounts:
3     - mountPath: /data
4       name: data
5 volumeClaimTemplates:
6 - metadata:
7     name: app-data
8   spec:
9     accessModes: [ "ReadWriteOnce" ]
10    resources:
11      requests:
12        storage: {{ first (pluck .Values.app.cloud .Values.app.storage.persistenVolumeSize) | quote }}
13      storageClassName: {{ first (pluck .Values.app.cloud .Values.app.storage.storgeclass) }}
14 {{ else }}
15     volumeMounts:
16     - mountPath: /data
17       emptyDir: {}
18 {{ end }}
```

УПРАВЛЕНИЕ БЛОКАМИ КОДА

```
1     spec:
2       containers:
3         - name: myapplication
4 {{- if eq .Values.global.env "production" }}
5         resources:
6           requests:
7             cpu: 3500m
8 {{- else if hasPrefix "review" .Values.global.env }}
9         resources:
10          requests:
11            cpu: 500m
12 {{ - else }}
13         resources:
14           limits:
15             cpu: 1500m
16 {{- end }}
```



ФУНКЦИЯ toYaml – values.yaml

```
1 resources:
2   prod:
3     limits:
4       cpu: '2'
5       memory: 4Gi
6     requests:
7       cpu: 1
8       memory: 2Gi
9   stage:
10    limits:
11      cpu: 500m
12      memory: 1Gi
13    requests:
14      cpu: 250m
15      memory: 500Mi
```

ФУНКЦИЯ toYaml – templating

```
1     spec:
2     containers:
3         - name: myapp
4           resources:
5 {{ toYaml .Values.resources.prod | indent 12 }}
```

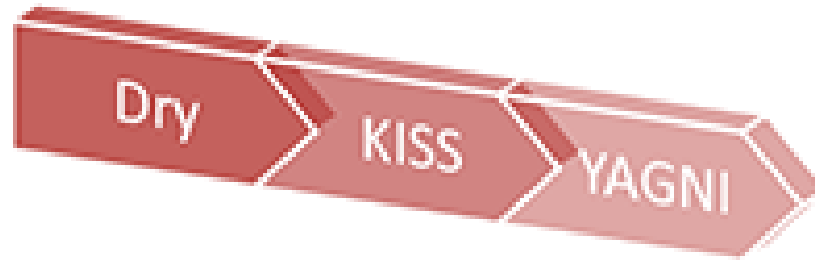


ФУНКЦИЯ toYaml – templating

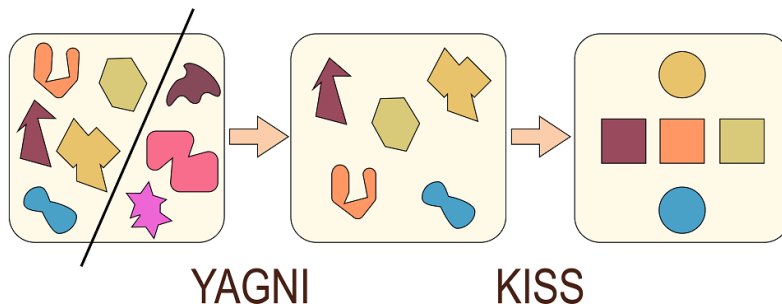
```
1 spec:
2   containers:
3     - name: myapp
4       resources:
5 {{ toYaml (pluck .Values.global.env .Values.resources | first) | indent 12 }}
```



MUSTHAVE YAML-ДЕВЕЛОПЕРА



1. Кастомизация приложения в разрезе окружений
2. Переиспользование кода
3. Управление блоками кода по условию
4. **Модульная разработка**
5. Трекинг выката
6. Установка очерёдности запуска подов
7. Отладка
8. Релизный цикл
9. Расширение функциональности HELM



“ТАК ИСТОРИЧЕСКИ СЛОЖИЛОСЬ”

```
.helm
├── Chart.yaml
├── templates
│   ├── 20-postgres.yaml
│   ├── 40-celery-beat.yaml
│   ├── 41-store-messages.yaml
│   ├── 42-reply-to-clients.yaml
│   ├── 50-listening-workers.yaml
│   ├── 60-app.yaml
│   ├── 61-api.yaml
│   ├── 65-metrics.yaml
│   ├── 70-rabbitmq.yaml
│   ├── 90-ingress.yaml
│   ├── 99-postgres-backup.yaml
│   ├── _envs.tpl
│   ├── cronjob-archive-messages.yaml
│   ├── job-archive-messages.yaml
│   ├── job-custom-tasks.yaml
│   ├── job-psql-flush-db.yaml
│   ├── job-migrate.yaml
│   └── job-tests.yaml
└── values.yaml
```

HELM МОДУЛЬНАЯ РАЗРАБОТКА

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

HELM МОДУЛЬНАЯ РАЗРАБОТКА

```
./mychart
├── Chart.yaml
├── charts
│   ├── backend
│   ├── ingress-tls
│   ├── job-load-db-dump
│   ├── job-mc-create-bucket
│   ├── job-migrations
│   ├── minio
│   ├── postgres
│   ├── postgres-backup
│   └── rabbitmq
├── templates
│   └── _envs.tpl
└── values.yaml
```

HELM SUBCHARTS Chart.yaml

```
apiVersion: v2
name: throw-backend
version: 0.0.1

dependencies:
- name: minio
  version: 6.2.11
  repository: https://charts.bitnami.com/bitnami
  condition: minio.enabled, global.contractTests.enabled
- name: backend
  version: 0.1
  repository: file://path/to/backend/chart
  condition: backend.enabled
- name: postgres
  version: 13.0.1
  repository: "@stable"
  condition: postgres.enabled
- name: rabbitmq
  version: 0.1
  condition: rabbitmq.enabled, global.contractTests.enabled
```


HELM SUBCHARTS Chart.yaml

```
apiVersion: v2
name: throw-backend
version: 0.0.1
```

```
dependencies:
```

- name: minio
version: 6.2.11
repository: <https://charts.bitnami.com/bitnami>
condition: minio.enabled, global.contractTests.enabled
- name: backend
version: 0.1
repository: file://path/to/backend/chart
condition: backend.enabled
- name: postgres
version: 13.0.1
repository: "@stable"
condition: postgres.enabled
- name: rabbitmq
version: 0.1
condition: rabbitmq.enabled, global.contractTests.enabled



HELM SUBCHARTS Chart.yaml

```
apiVersion: v2
name: throw-backend
version: 0.0.1
```

dependencies:

- name: minio
version: 6.2.11
repository: https://charts.bitnami.com/bitnami
condition: minio.enabled, global.contractTests.enabled
- name: backend
version: 0.1
repository: file://path/to/backend/chart
condition: backend.enabled
- name: postgres
version: 13.0.1
repository: "@stable"
condition: postgres.enabled
- name: rabbitmq
version: 0.1
condition: rabbitmq.enabled, global.contractTests.enabled



HELM SUBCHARTS Chart.yaml

```
apiVersion: v2
name: throw-backend
version: 0.0.1
```

```
dependencies:
```

- name: minio
version: 6.2.11
repository: https://charts.bitnami.com/bitnami
condition: minio.enabled, global.contractTests.enabled
- name: backend
version: 0.1
repository: file://path/to/backend/chart
condition: backend.enabled
- name: postgres
version: 13.0.1
repository: "@stable"
condition: postgres.enabled
- name: rabbitmq
version: 0.1
condition: rabbitmq.enabled, global.contractTests.enabled



HELM SUBCHARTS Chart.yaml

```
apiVersion: v2
name: throw-backend
version: 0.0.1

dependencies:
- name: minio
  version: 6.2.11
  repository: https://charts.bitnami.com/bitnami
  condition: minio.enabled, global.contractTests.enabled
- name: backend
  version: 0.1
  repository: file://path/to/backend/chart
  condition: backend.enabled
- name: postgres
  version: 13.0.1
  repository: "@stable"
  condition: postgres.enabled
- name: rabbitmq
  version: 0.1
  condition: rabbitmq.enabled, global.contractTests.enabled
```



РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ

```
apiVersion: v2
name: throw-backend
version: 0.0.1


dependencies:
- name: minio
  version: 6.2.11
  repository: https://charts.bitnami.com/bitnami
  condition: minio.enabled, global.contractTests.enabled
- name: backend
  version: 0.1
  repository: file://path/to/backend/chart
  condition: backend.enabled
- name: postgres
  version: 13.0.1
  repository: "@stable"
  condition: postgres.enabled
```

helm dependency update

УСЛОВИЯ ВКЛЮЧЕНИЯ ЧАРТА

```
1 apiVersion: v2
2 name: throw-backend
3 version: 0.0.1
4
5 dependencies:
6 - name: minio
7   version: 0.1
8   condition: minio.enabled, global.contractTests.enabled
9   tags:
10     - environment
11     - contracttests
12 - name: backend
13   version: 0.1
14   condition: backend.enabled, global.contractTests.enabled
15   tags:
16     - environment
17     - contracttests
18 - name: job-mc-create-bucket
19   version: 0.1
20   condition: job-mc-create-bucket.enabled
21 - name: job-migrations
22   version: 0.1
23   tags:
24     - migrations
```

УСЛОВИЯ ВКЛЮЧЕНИЯ ЧАРТА



```
1 apiVersion: v2
2 name: throw-backend
3 version: 0.0.1
4
5 dependencies:
6 - name: minio
7   version: 0.1
8   condition: minio.enabled, global.contractTests.enabled
9   tags:
10     - environment
11     - contracttests
12 - name: backend
13   version: 0.1
14   condition: backend.enabled, global.contractTests.enabled
15   tags:
16     - environment
17     - contracttests
18 - name: job-mc-create-bucket
19   version: 0.1
20   condition: job-mc-create-bucket.enabled
21 - name: job-migrations
22   version: 0.1
23   tags:
24     - migrations
```

УСЛОВИЯ ВКЛЮЧЕНИЯ ЧАРТА

```
1 apiVersion: v2
2 name: throw-backend
3 version: 0.0.1
4
5 dependencies:
6 - name: minio
7   version: 0.1
8   condition: minio.enabled, global.contractTests.enabled
9   tags:
10     - environment
11     - contracttests
12 - name: backend
13   version: 0.1
14   condition: backend.enabled, global.contractTests.enabled
15   tags:
16     - environment
17     - contracttests
18 - name: job-mc-create-bucket
19   version: 0.1
20   condition: job-mc-create-bucket.enabled
21 - name: job-migrations
22   version: 0.1
23   tags:
24     - migrations
```



CONDITIONS и TAGS – values.yaml

```
1 # conditions
2 minio:
3   enabled: true
4 postgresql:
5   enabled: true
6 backend:
7   enabled: true
8 rabbitmq:
9   enabled: true
10 job-load-db-dump:
11   enabled: false
12 # tags
13 tags:
14   environment: true
15   migrations: false
```

CONDITIONS и TAGS – ВЫЗОВ HELM

```
helm upgrade --install -n ${CI_NAMESPACE} ${RELEASENAME} .infra/helm \
  --set "backend.enabled=true" \
  --set "minio.enabled=true" \
  --set "postgres.enabled=true" \
  --set "rabbitmq.enabled=true" \
  --set "tags.migrations=false"
```

VALUES IN SUBCHARTS

```
1 global:
2   system:
3     storageclass: "hdd"
4   tests: "no"
5   app:
6     DB_URL: postgres://myapp:mypass@postgres:5432/backend
7     RMQ_URL: amqp://rabbitmq:mypass@rabbitmq
8
9 postgres:
10  POSTGRES_USER: "backend"
11  POSTGRES_PASSWORD: "mypassword"
12
13 minio:
14  storage: '2Gi'
15  MINIO_KEY: '123123123'
16
17 rabbitmq:
18  rmq:
19    pvc:
20      size: '2Gi'
```

VALUES IN SUBCHARTS



```
1 global:
2   system:
3     storageclass: "hdd"
4   tests: "no"
5   app:
6     DB_URL: postgres://myapp:mypass@postgres:5432/backend
7     RMQ_URL: amqp://rabbitmq:mypass@rabbitmq
8
9 postgres:
10  POSTGRES_USER: "backend"
11  POSTGRES_PASSWORD: "mypassword"
12
13 minio:
14  storage: '2Gi'
15  MINIO_KEY: '123123123'
16
17 rabbitmq:
18  rmq:
19    pvc:
20      size: '2Gi'
```

VALUES IN SUBCHARTS

```
1 global:
2   system:
3     storageclass: "hdd"
4   tests: "no"
5   app:
6     DB_URL: postgres://myapp:mypass@postgres:5432/backend
7     RMQ_URL: amqp://rabbitmq:mypass@rabbitmq
8
9 postgres:
10   POSTGRES_USER: "backend"
11   POSTGRES_PASSWORD: "mypassword"
12
13 minio:
14   storage: '2Gi'
15   MINIO_KEY: '123123123'
16
17 rabbitmq:
18   rmq:
19     pvc:
20       size: '2Gi'
```

NAMED TEMPLATES & SUBCHARTS

```
./mychart
├── Chart.yaml
├── charts
│   ├── backend
│   ├── ingress-tls
│   ├── job-load-db-dump
│   ├── job-mc-create-bucket
│   ├── job-migrations
│   ├── minio
│   ├── postgres
│   ├── postgres-backup
│   └── rabbitmq
├── templates
│   └── _envs.tpl
└── values.yaml
```

`_*.tpl` `_*.yaml`



```
1 apiVersion: v2
2 name: mylibchart
3 description: A Helm chart for Kubernetes
4 type: library
5 version: 0.1.0
6 appVersion: "1.16.0"
```

Library charts

NAMED TEMPLATES – AFFINITY

```
1 {{ define "affinity" }}
2 {{ if eq .Values.global.ens "production" }}
3     affinity:
4     podAntiAffinity:
5         requiredDuringSchedulingIgnoredDuringExecution:
6         - labelSelector:
7             matchExpressions:
8             - key: app
9               operator: In
10             values:
11             - {{ .Chart.Name }}
12         topologyKey: kubernetes.io/hostname
13 {{ end }}
14 {{ end }}
```

NAMED TEMPLATES – AFFINITY

```
1 {{ define "affinity" }}
2 {{ if eq .Values.global.ens "production" }}
3     affinity:
4     podAntiAffinity:
5         requiredDuringSchedulingIgnoredDuringExecution:
6         - labelSelector:
7             matchExpressions:
8             - key: app
9               operator: In
10             values:
11             - {{ .Chart.Name }}
12             topologyKey: kubernetes.io/hostname
13 {{ end }}
14 {{ end }}
```


РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ

The screenshot shows a web browser window with the Artifact Hub website. The browser's address bar displays the URL `artifacthub.io/packages/search?page=1&kind=0`. The page header features the Artifact Hub logo, a search bar with the placeholder text "Search packages", and links for "SIGN UP" and "SIGN IN". A red arrow points to the search bar. Below the header, a status bar indicates "1 - 20 of 2397 results (some filters applied)" and a "Show: 20" dropdown menu. The main content area is divided into a left sidebar with filters and a right section showing search results. The filters include "Official" and "Verified publishers" checkboxes, and a "KIND" section with "Helm charts (2397)", "OLM operators (163)", and "Krew kubectl plu... (141)". The search results section displays a card for the "kube-prometheus-stack" package, which includes its logo, name, origin (Prometheus), repository (prometheus-commu...), version (13.13.1), app version (0.45.0), a description, update time (21 hours ago), star count (73), and a "Helm chart" badge. It also features "Official" and "Verified Publisher" badges.

Artifact Hub

artifacthub.io/packages/search?page=1&kind=0

Artifact HUB **BETA** Search packages SIGN UP SIGN IN


1 - 20 of 2397 results (some filters applied) Show: 20

FILTERS Reset

☐ Official ☐ Verified publishers

KIND

☒ Helm charts (2397)
☐ OLM operators (163)
☐ Krew kubectl plu... (141)

 **kube-prometheus-stack**
ORG: Prometheus REPO: prometheus-commu...
VERSION: 13.13.1 APP VERSION: 0.45.0

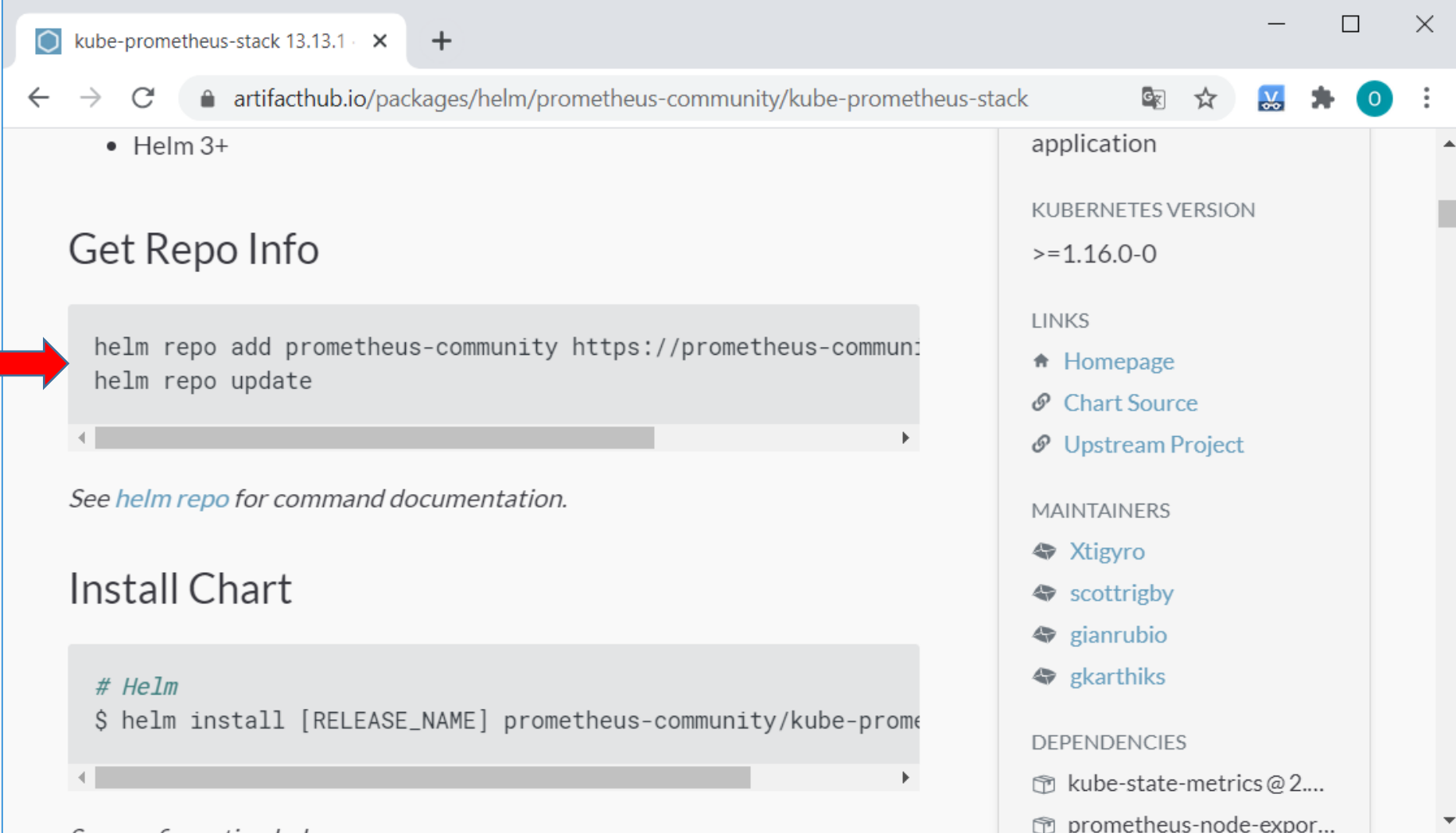
kube-prometheus-stack collects Kubernetes manifests, Grafana dashboards,...

Updated 21 hours ago

★ 73 Helm chart

Official Verified Publisher

РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ



The screenshot shows a web browser window with the URL `artifacthub.io/packages/helm/prometheus-community/kube-prometheus-stack`. The page is for the `kube-prometheus-stack` Helm chart, version 13.13.1. A red arrow points to the terminal commands for adding the repository and updating it.

Get Repo Info

```
helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
helm repo update
```

See [helm repo](#) for command documentation.

Install Chart

```
# Helm
$ helm install [RELEASE_NAME] prometheus-community/kube-prometheus-stack
```

application

KUBERNETES VERSION
>=1.16.0-0

LINKS

- [Homepage](#)
- [Chart Source](#)
- [Upstream Project](#)


MAINTAINERS

- [Xtigyro](#)
- [scottrigby](#)
- [gianrubio](#)
- [gkarthiks](#)

DEPENDENCIES

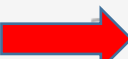
- `kube-state-metrics@2...`
- `prometheus-node-exporter@0.18.1`

РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ



```
1 :~> helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
2 has been added to your repositories
3 :~> helm repo update
4 Hang tight while we grab the latest from your chart repositories...
5 ...Successfully got an update from the "prometheus-community" chart repository
6 Update Complete. ✨Happy Helming!✨
7 :~> helm search repo prometheus-operator
8 NAME                                CHART VERSION  APP VERSION    DESCRIPTION
9 prometheus-community/prometheus-operator  9.3.2          0.38.1         DEPRECATED - This
10 :~> helm fetch prometheus-community/prometheus-operator
11 :~> tar -xvf prometheus-operator-9.3.2.tgz
12 prometheus-operator/Chart.yaml
13 prometheus-operator/values.yaml
14 prometheus-operator/templates/NOTES.txt
15 prometheus-operator/templates/_helpers.tpl
16 prometheus-operator/templates/alertmanager/alertmanager.yaml
17 prometheus-operator/templates/alertmanager/ingress.yaml
18 prometheus-operator/templates/alertmanager/ingressperreplica.yaml
```

РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ

```
1 :~> helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
2 has been added to your repositories
3
4 :~> helm repo update
4 Hang tight while we grab the latest from your chart repositories...
5 ...Successfully got an update from the "prometheus-community" chart repository
6 Update Complete. ☸Happy Helming!☸
7 :~> helm search repo prometheus-operator
8 NAME                                CHART VERSION  APP VERSION    DESCRIPTION
9 prometheus-community/prometheus-operator  9.3.2          0.38.1         DEPRECATED - This
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12 prometheus-operator/Chart.yaml
13 prometheus-operator/values.yaml
14 prometheus-operator/templates/NOTES.txt
15 prometheus-operator/templates/_helpers.tpl
16 prometheus-operator/templates/alertmanager/alertmanager.yaml
17 prometheus-operator/templates/alertmanager/ingress.yaml
18 prometheus-operator/templates/alertmanager/ingressperreplica.yaml
```

РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ

```
1 :~> helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
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4 Hang tight while we grab the latest from your chart repositories...
5 ...Successfully got an update from the "prometheus-community" chart repository
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```



```
7 :~> helm search repo prometheus-operator
```

8 NAME	CHART VERSION	APP VERSION	DESCRIPTION
9 prometheus-community/prometheus-operator	9.3.2	0.38.1	DEPRECATED - This

```
10 :~> helm fetch prometheus-community/prometheus-operator
```

```
11 :~> tar -xvf prometheus-operator-9.3.2.tgz
```

```
12 prometheus-operator/Chart.yaml
```

```
13 prometheus-operator/values.yaml
```

```
14 prometheus-operator/templates/NOTES.txt
```

```
15 prometheus-operator/templates/_helpers.tpl
```

```
16 prometheus-operator/templates/alertmanager/alertmanager.yaml
```

```
17 prometheus-operator/templates/alertmanager/ingress.yaml
```

```
18 prometheus-operator/templates/alertmanager/ingressperreplica.yaml
```

РАБОТА С ВНЕШНИМИ РЕПОЗИТОРИЯМИ

```
1 :~> helm repo add prometheus-community https://prometheus-community.github.io/helm-charts
```

```
2 has been added to your repositories
```

```
3 :~> helm repo update
```

```
4 Hang tight while we grab the latest from your chart repositories...
```

```
5 ...Successfully got an update from the "prometheus-community" chart repository
```

```
6 Update Complete. ✨Happy Helming!✨
```

```
7 :~> helm search repo prometheus-operator
```

8 NAME	CHART VERSION	APP VERSION	DESCRIPTION
9 prometheus-community/prometheus-operator	9.3.2	0.38.1	DEPRECATED - This

```
10 :~> helm fetch prometheus-community/prometheus-operator
```

```
11 :~> tar -xvf prometheus-operator-9.3.2.tgz
```

```
12 prometheus-operator/Chart.yaml
```

```
13 prometheus-operator/values.yaml
```

```
14 prometheus-operator/templates/NOTES.txt
```

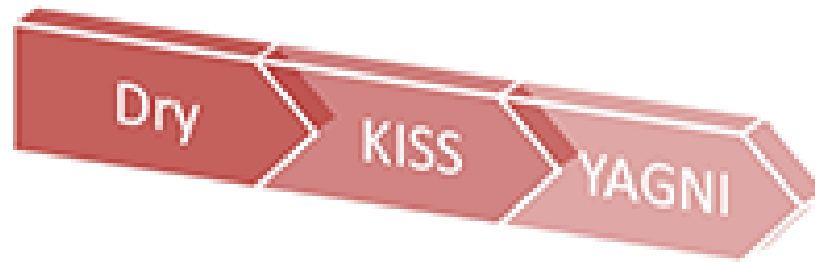
```
15 prometheus-operator/templates/_helpers.tpl
```

```
16 prometheus-operator/templates/alertmanager/alertmanager.yaml
```

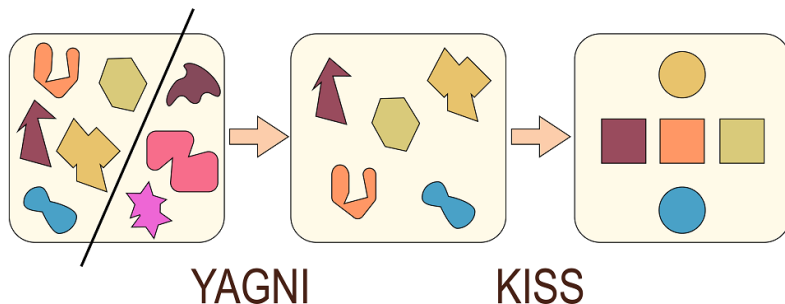
```
17 prometheus-operator/templates/alertmanager/ingress.yaml
```

```
18 prometheus-operator/templates/alertmanager/ingressperreplica.yaml
```

MUSTHAVE YAML-ДЕВЕЛОПЕРА



1. Кастомизация приложения в разрезе окружений
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ТРЕКИНГ ВЫКАТА

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \
--wait \
--timeout 600s \
--debug
```

```
wait.go:53: [debug] beginning wait for 6 resources with timeout of 10m0s
wait.go:244: [debug] Deployment is not ready: app-test/app. 0 out of 1 expected pods are ready
wait.go:244: [debug] Deployment is not ready: app-test/app. 0 out of 1 expected pods are ready
wait.go:244: [debug] Deployment is not ready: app-test/app. 0 out of 1 expected pods are ready
wait.go:244: [debug] Deployment is not ready: app-test/app. 0 out of 1 expected pods are ready
upgrade.go:138: [debug] updating status for upgraded release for app-test
Release "app-test" has been upgraded. Happy Helming!
NAME: app-test
```


KUBERNETES DEPLOYMENT STRATEGIES

```
k -n myapp get deployments.apps
```

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
myapp	1/1	1	1	151d

```
1 spec:
2   strategy:
3     type: RollingUpdate
4     rollingUpdate:
5       maxUnavailable: 0
6       maxSurge: 1
```



```
1 spec:
2   strategy:
3     type: RollingUpdate
4     rollingUpdate:
5       maxUnavailable: 1
6       maxSurge: 1
```



ОТКАТ ВЫКАТА

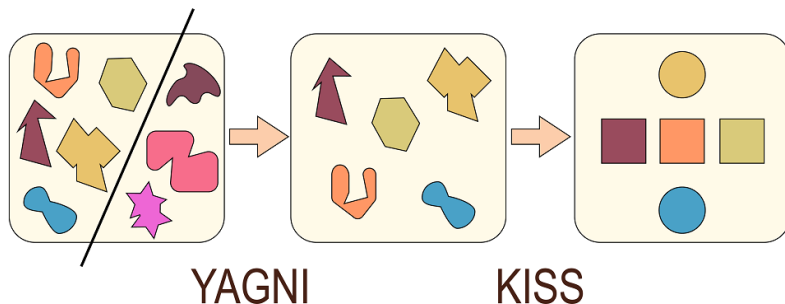
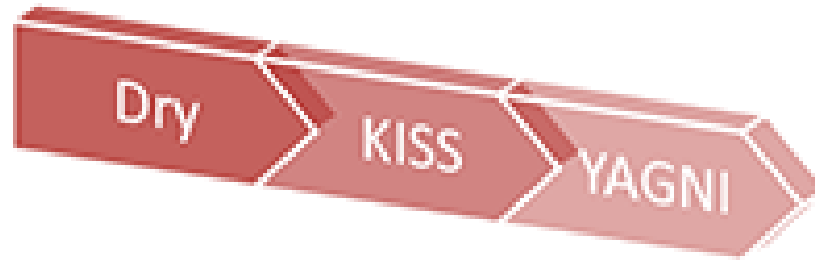
- Ручной откат

```
helm rollback -n ci-namespace ci-release [REVISION]
```

- Автоматический откат

```
helm upgrade --install -n ci-namespace ci-release path/to/chart \  
--atomic
```

MUSTHAVE YAML-ДЕВЕЛОПЕРА



1. Кастомизация приложения в разрезе окружений
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HELM LIFECYCLE HOOKS

- pre-install Executes after templates are rendered, but before any resources are created in Kubernetes
- post-install Executes after all resources are loaded into Kubernetes
- pre-delete Executes on a deletion request before any resources are deleted from Kubernetes
- post-delete Executes on a deletion request after all of the release's resources have been deleted
- pre-upgrade Executes on an upgrade request after templates are rendered, but before any resources are updated
- post-upgrade Executes on an upgrade request after all resources have been upgraded
- pre-rollback Executes on a rollback request after templates are rendered, but before any resources are rolled back
- post-rollback Executes on a rollback request after all resources have been modified
- test Executes when the Helm test subcommand is invoked (view test docs)


Guide: https://helm.sh/docs/topics/charts_hooks/

HELM LIFECYCLE HOOKS

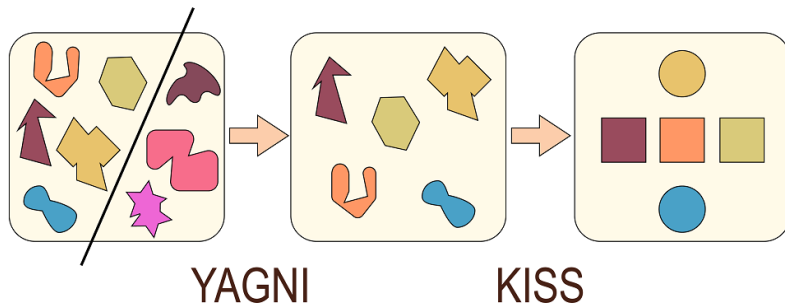
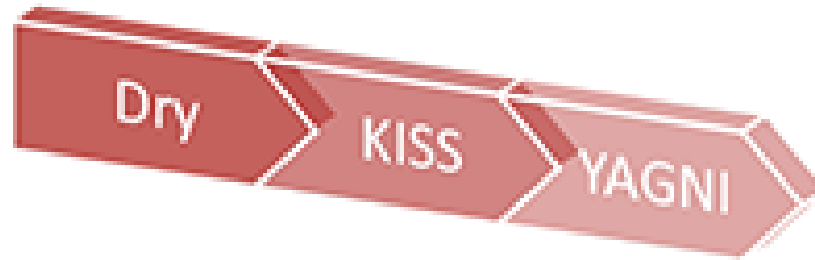
```
1 ---
2 apiVersion: batch/v1
3 kind: Job
4 metadata:
5   name: migration
6   annotations:
7     "helm.sh/hook": post-install,pre-upgrade
8     "helm.sh/hook-weight": "5"
9     "helm.sh/hook-delete-policy": hook-succeeded
10 spec:
11   activeDeadlineSeconds: 600
12   template:
13     spec:
14       containers:
15         - name: migration
16           command: ['/bin/sh', '-c', 'python manage.py migrate']
17           image: {{ .Values.global.image_name }}
18           env:
19             {{- include "app_envs" . | indent 12 }}
20             name: migration
21             restartPolicy: Never
22             imagePullSecrets:
23               - name: registrysecret
24             backoffLimit: 2
```

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```
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2 apiVersion: batch/v1
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MUSTHAVE YAML-ДЕВЕЛОПЕРА



1. Кастомизация приложения в разрезе окружений
2. Переиспользование кода
3. Управление блоками кода по условию
4. Модульная разработка
5. Трекинг выката
6. Установка очерёдности запуска подов
7. **Отладка**
8. Релизный цикл
9. Расширение функциональности HELM

HELM CHART DEBUG – LINTER

```
1 :~> helm lint ./mychart --set global.env=develop
2 ==> Linting ./mychart
3 [INFO] Chart.yaml: icon is recommended
4
5 1 chart(s) linted, 0 chart(s) failed
```


HELM CHART DEBUG – TEMPLATE

```
1 :~> helm template ./mychart --set global.env=develop
2 ---
3 # Source: mychart/templates/20-mychart.yaml
4 apiVersion: v1
5 kind: Service
6 metadata:
7   name: mychart
8   labels:
9     app: mychart
10 spec:
11   clusterIP: None
12   ports:
13     - name: http
14       port: 8080
15   selector:
16     app: mychart
17 ---
```

--debug

HELM CHART DEBUG – DRY RUN

helm install / helm upgrade --**dry-run**

```
1 :~> helm upgrade --dry-run -n mychart-test myapp-test ./mychart --set global.env=develop
2 Release "mapp-test" has been upgraded. Happy Helming!
3 NAME: mapp-test
4 LAST DEPLOYED: Mon May 13 15:09:57 2021
5 NAMESPACE: mychart-test
6 STATUS: pending-upgrade
7 REVISION: 4
8 TEST SUITE: None
9 HOOKS:
10 MANIFEST:
11 ---
12 # Source: mychart/templates/20-mychart.yaml
13 apiVersion: v1
14 kind: Service
```

ДОКУМЕНТАЦИЯ

```
./mychart
├── Chart.yaml
├── charts
├── templates
│   ├── NOTES.txt
│   ├── _helpers.tpl
│   ├── deployment.yaml
│   ├── hpa.yaml
│   ├── ingress.yaml
│   ├── service.yaml
│   ├── serviceaccount.yaml
│   └── tests
│       └── test-connection.yaml
└── values.yaml
```

NOTES.txt – информация о релизе

```
1 Деплой релиза {{ .Release.Name }}  
2 в окружение {{ .Values.global.env }} прошел!  
3 Приложение установлено в namespace:  
4 - {{ .Release.Namespace }}  
5 Вэб-интерфейс доступен по адресу:  
6 http://{{ .Values.global.ci_url }}
```

- NOTES.txt

```
1 Деплой релиза myapp-test  
2 в окружение test прошел!  
3 Приложение установлено в namespace:  
4 - mychart-test  
5 Вэб-интерфейс доступен по адресу:  
6 http://mychart-test.kube.company.local
```

- ВЫВОД

КОМЕНТАРИИ

YAML comments:

```
# This is a comment  
type: sprocket
```

Template Comments:

```
{{- /*  
This is a comment.  
*/}}  
type: frobnitz
```

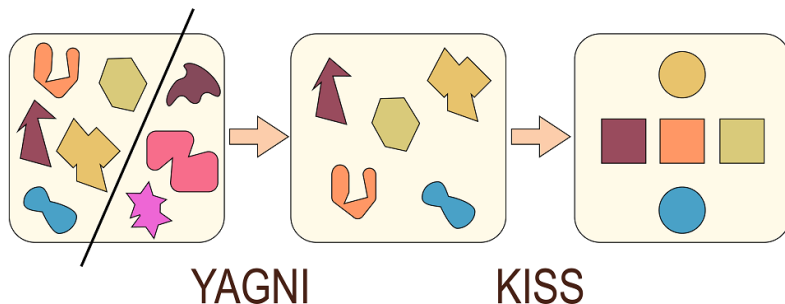
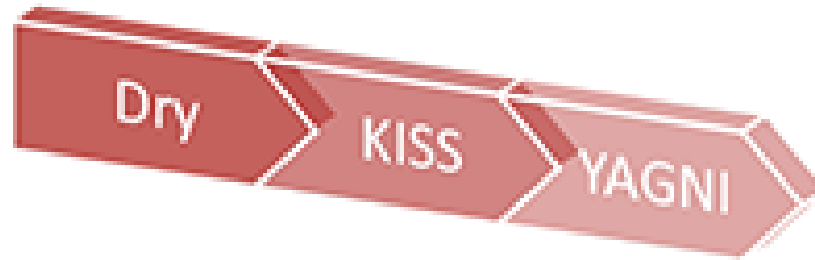
HELM ПРОСМОТР/УДАЛЕНИЕ РЕЛИЗОВ

- `helm list -n namespace`
- `helm get manifest -n namespace release-name`

```
1 :~> helm -n mychart-test list -a
2 NAME                NAMESPACE      REVISION      UPDATED                               STATUS
3 myapp-test          mychart-test    3             2021-05-13 12:44:47.467142093 +0000 UTC deployed
4 :~> helm -n keycloak-test get manifest keycloak-test
5 ---
6 # Source: mychart/templates/20-mychart.yaml
7 apiVersion: v1
8 kind: Service
9 metadata:
10   name: mychart
11   labels:
12     app: mychart
```

- `helm -n namespace delete release-name`

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HELM PLUGINS

Helm Diff	Preview helm upgrade as a coloured diff
helm-monitor	Plugin to monitor a release and rollback based on Prometheus/ElasticSearch query
helm-s3	Helm plugin that allows to use AWS S3 as a [private] chart repository
helm-git	Install charts and retrieve values files from your Git repositories
helm-secrets	Plugin to manage and store secrets safely (based on sops)
helm-tanka	A Helm plugin for rendering Tanka/Jsonnet inside Helm charts.

List: <https://helm.sh/docs/community/related/>

Guide: https://helm.sh/docs/helm/helm_plugin/

.Files

./mychart

- Chart.yaml
- files
 - config1.conf ←
- charts
 - backend
 - ingress-tls
 - job-load-db-dump
 - job-mc-create-bucket
 - job-migrations
 - minio
 - postgres
 - postgres-backup
 - rabbitmq
- templates
 - secret1.yaml ←
 - _envs.tpl
- values.yaml

```
1 apiVersion: v1
2 kind: Secret
3 metadata:
4   name: {{ .chart.Name }}-secret
5 type: Opaque
6 data:
7   token: |-
8     {{ .Files.Get "files/config1.conf" | b64enc }}
```



Happy helming!

